

**ABSTRACT OF THE DISCLOSURE**

The present invention is generally directed to a semiconductor device formed over a multiple thickness buried oxide layer, and various methods of making same. In one illustrative embodiment, the device comprises a bulk substrate, a multiple thickness buried oxide layer formed above the bulk substrate, and an active layer formed above the multiple thickness buried oxide layer, the semiconductor device being formed in the active layer above the multiple thickness buried oxide layer. In some embodiments, the multiple thickness buried oxide layer is comprised of a first section positioned between two second sections, the first section having a thickness that is less than the thickness of the second sections. In one illustrative embodiment, the method comprises performing a first oxygen ion implant process on a silicon substrate, forming a masking layer above the substrate, performing a second oxygen ion implant process on the substrate through the masking layer, and performing at least one heating process on the substrate to form a multiple thickness buried oxide layer in the substrate. In another illustrative embodiment, the method comprises performing a first oxygen ion implant process on a silicon substrate, forming a masking layer above the substrate, performing a second oxygen ion implant process on the substrate through the masking layer, and performing at least one heating process on the substrate to form a multiple thickness buried oxide layer in the substrate. In yet another illustrative embodiment, the method comprises forming a multiple thickness buried oxide layer using a wafer bonding technique.